

We claim:

1. An intake manifold for supplying air and exhaust recirculation gas (EGR) to an internal combustion engine, the cast manifold comprising:
  - an air intake port;
  - an intake chamber receiving intake air from the intake port;
  - an outlet plenum communicated with the engine;
  - an EGR inlet port;
  - first and second spaced apart EGR valve chambers;
  - a first EGR passage communicating the EGR inlet port with the first EGR valve chamber;
  - a second EGR passage communicating the EGR inlet port with the second EGR valve chamber;
  - a central EGR outlet passage communicating an end of each EGR valve chamber with a central portion of the plenum;
  - a first EGR outlet chamber receiving EGR from the first EGR valve chamber and having outlet ports communicating with a first end of the plenum;
  - a second EGR outlet chamber receiving EGR from the second EGR valve chamber and having outlet ports communicating with a second end of the plenum;
  - and
  - a wall separating the intake chamber from the central EGR outlet passage chamber and from one of the EGR inlet passages, said wall creating turbulence in the intake air as the EGR from the central EGR outlet passage mixes with intake air from the intake chamber.
2. The intake manifold of claim 1, wherein:
  - at least a portion of the wall extends substantially normal to a central axis of the intake port.
3. The intake manifold of claim 1, wherein:
  - the wall comprises a first wall portion extending substantially normal to a central axis of the intake port, a second wall portion extending substantially parallel to a central axis of the intake port and a third wall portion extending substantially normal to a central axis of the intake port, the second wall portion extending from the

first wall portion to the second wall portion.

4. The intake manifold of claim 3, wherein:

the first and second wall portions join at a corner which is exposed to air flowing from the air intake port.

5. The intake manifold of claim 1, further comprising:

a first upper EGR passage communicating EGR from an upper portion of the first EGR valve chamber to an upper portion of the first EGR outlet chamber, a first lower EGR passage communicating EGR from a lower portion of the first EGR valve chamber to a lower portion of the first end EGR outlet chamber; and

a second upper EGR passage communicating EGR from an upper portion of the second EGR valve chamber to an upper portion of the second EGR outlet chamber, a second lower EGR passage communicating EGR from a lower portion of the second EGR valve chamber to a lower portion of the second EGR outlet chamber.

6. An intake manifold for supplying air and exhaust recirculation gas (EGR) to an internal combustion engine, the manifold comprising:

a generally vertical air intake port;

an intake chamber receiving intake air from the intake port;

a generally vertical EGR inlet port having a central axis spaced apart from a central axis of the intake port;

a first generally vertically extending EGR valve chamber;

a second generally vertically extending EGR valve chamber;

a first EGR passage communicating the EGR inlet port with the first EGR valve chamber;

a second EGR passage communicating the EGR inlet port with the second EGR valve chamber;

a central EGR chamber communicating an upper portion of the first EGR valve chamber with an upper portion of the second EGR valve chamber;

an outlet plenum communicated with the engine, the intake chamber and the central EGR chamber;

a central EGR outlet communicating the central EGR chamber to the outlet

plenum; and

a wall separating the central EGR chamber from the intake chamber and extending substantially normal to the central axis of the intake port, said wall creating turbulence in the intake air as the EGR from the central EGR chamber mixes with intake air from the intake chamber.

7. The intake manifold of claim 6, further comprising:

a end EGR chamber, an upper EGR passage communicating EGR from an upper portion of the first EGR valve chamber to an upper portion of the end EGR chamber, a lower EGR passage communicating EGR from a lower portion of the first EGR valve chamber to a lower portion of the end EGR chamber, and an end EGR outlet for communicating the end EGR chamber with the outlet plenum.

8. The intake manifold of claim 6, further comprising:

a first end EGR chamber, a first upper EGR passage communicating EGR from an upper portion of the first EGR valve chamber to an upper portion of the first end EGR chamber, a first lower EGR passage communicating EGR from a lower portion of the first EGR valve chamber to a lower portion of the first end EGR chamber, and a first end EGR outlet for communicating the first end EGR chamber with the outlet plenum; and

a second end EGR chamber, a second upper EGR passage communicating EGR from an upper portion of the second EGR valve chamber to an upper portion of the second end EGR chamber, a second lower EGR passage communicating EGR from a lower portion of the second EGR valve chamber to a lower portion of the second end EGR chamber, and a second end EGR outlet for communicating the second end EGR chamber with the outlet plenum.

9. An intake manifold for supplying air and exhaust recirculation gas (EGR) to an internal combustion engine, the cast manifold comprising:

an air intake port;

an intake chamber receiving intake air from the intake port;

an outlet plenum communicated with the engine;

an EGR inlet port;

an EGR outlet passage communicating the EGR inlet port with the plenum;

a wall separating the intake chamber from the EGR outlet passage, said wall creating turbulence in the intake air as the EGR from the EGR outlet passage mixes with intake air from the intake chamber.

10. The intake manifold of claim 9, wherein:

at least a portion of the wall extends substantially normal to a central axis of the intake port.

11. The intake manifold of claim 9, wherein:

the wall comprises a first wall portion extending substantially normal to a central axis of the intake port, a second wall portion extending substantially parallel to a central axis of the intake port and a third wall portion extending substantially normal to a central axis of the intake port, the second wall portion extending from the first wall portion to the second wall portion.

12. The intake manifold of claim 11, wherein:

the first and second wall portions join at a corner which is exposed to air flowing from the air intake port.